FIG. 1

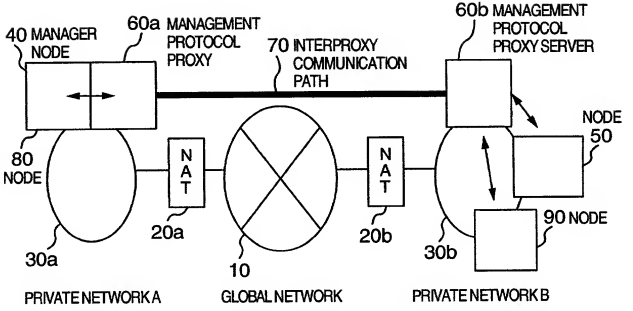

40 MANAGER NODE
60a MANAGEMENT PROTOCOL PROXY
70 INTERPROXY COMMUNICATION PATH
60b MANAGEMENT PROTOCOL PROXY SERVER
NODE 50
80 NODE
NAT
20a
NAT
20b
90 NODE
30a
10
30b
PRIVATE NETWORK A
GLOBAL NETWORK
PRIVATE NETWORK B

FIG. 2

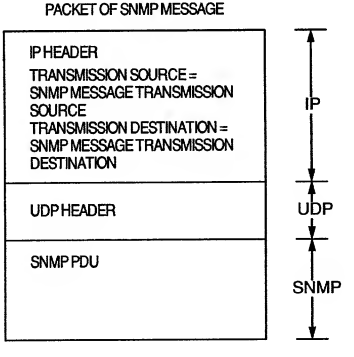

PACKET OF SNMP MESSAGE
IP HEADER
TRANSMISSION SOURCE = SNMP MESSAGE TRANSMISSION SOURCE
TRANSMISSION DESTINATION = SNMP MESSAGE TRANSMISSION DESTINATION
UDP HEADER
SNMP PDU
IP
UDP
SNMP

FIG. 3

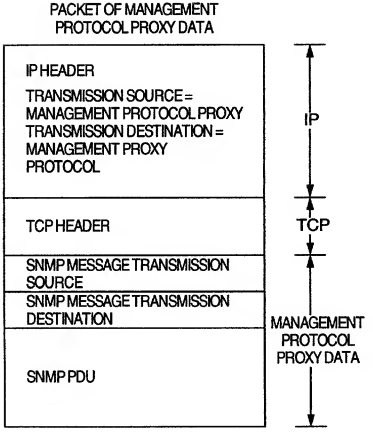

PACKET OF MANAGEMENT PROTOCOL PROXY DATA
IP HEADER
TRANSMISSION SOURCE = MANAGEMENT PROTOCOL PROXY
TRANSMISSION DESTINATION = MANAGEMENT PROXY PROTOCOL
TCP HEADER
SNMP MESSAGE TRANSMISSION SOURCE
SNMP MESSAGE TRANSMISSION DESTINATION
SNMP PDU
IP
TCP
MANAGEMENT PROTOCOL PROXY DATA

FIG. 4

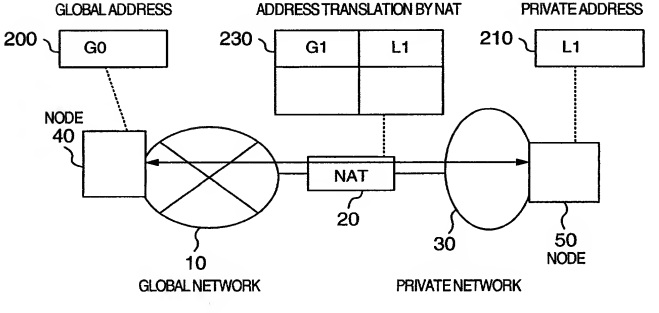

GLOBAL ADDRESS
ADDRESS TRANSLATION BY NAT
PRIVATE ADDRESS
200
G0
230
G1
L1
210
L1
NODE
40
NAT
20
30
50
NODE
10
GLOBAL NETWORK
PRIVATE NETWORK

FIG. 5

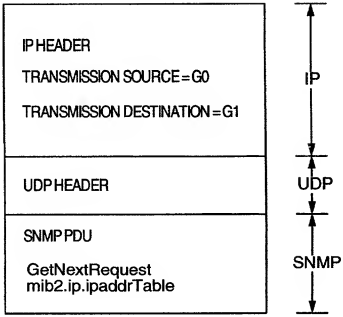

IP HEADER
TRANSMISSION SOURCE = G0
TRANSMISSION DESTINATION = G1
UDP HEADER
SNMP PDU
GetNextRequest
mib2.ip.ipaddrTable
IP
UDP
SNMP

FIG. 6

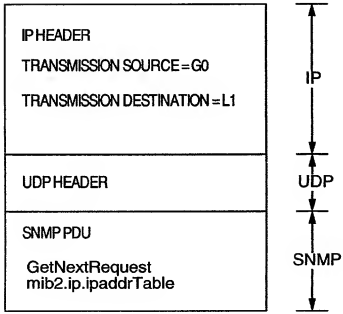

IP HEADER
TRANSMISSION SOURCE = G0
TRANSMISSION DESTINATION = L1
UDP HEADER
SNMP PDU
GetNextRequest
mib2.ip.ipaddrTable
IP
UDP
SNMP

FIG. 7

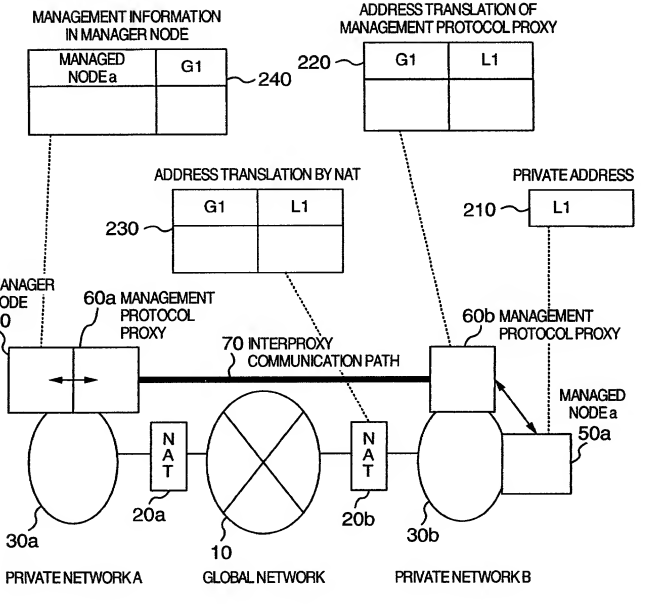

MANAGEMENT INFORMATION IN MANAGER NODE
MANAGED NODE a
G1
240
ADDRESS TRANSLATION OF MANAGEMENT PROTOCOL PROXY
220
G1
L1
ADDRESS TRANSLATION BY NAT
230
G1
L1
PRIVATE ADDRESS
210
L1
MANAGER NODE
40
60a MANAGEMENT PROTOCOL PROXY
70 INTERPROXY COMMUNICATION PATH
60b MANAGEMENT PROTOCOL PROXY
MANAGED NODE a
50a
NAT
20a
NAT
20b
30a
10
30b
PRIVATE NETWORK A
GLOBAL NETWORK
PRIVATE NETWORK B

FIG. 8

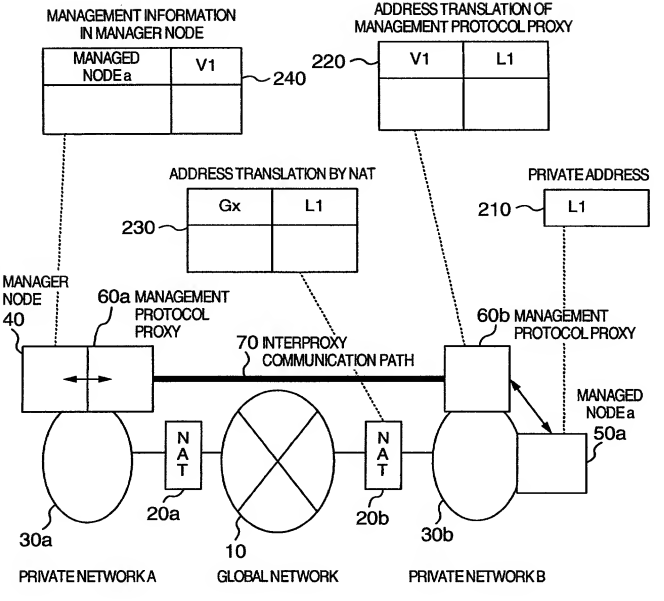

MANAGEMENT INFORMATION IN MANAGER NODE
MANAGED NODE a
V1
240
ADDRESS TRANSLATION OF MANAGEMENT PROTOCOL PROXY
220
V1
L1
ADDRESS TRANSLATION BY NAT
230
Gx
L1
PRIVATE ADDRESS
210
L1
MANAGER NODE
40
60a MANAGEMENT PROTOCOL PROXY
70 INTERPROXY COMMUNICATION PATH
60b MANAGEMENT PROTOCOL PROXY
MANAGED NODE a
50a
NAT
20a
NAT
20b
30a
10
30b
PRIVATE NETWORK A
GLOBAL NETWORK
PRIVATE NETWORK B

FIG. 9

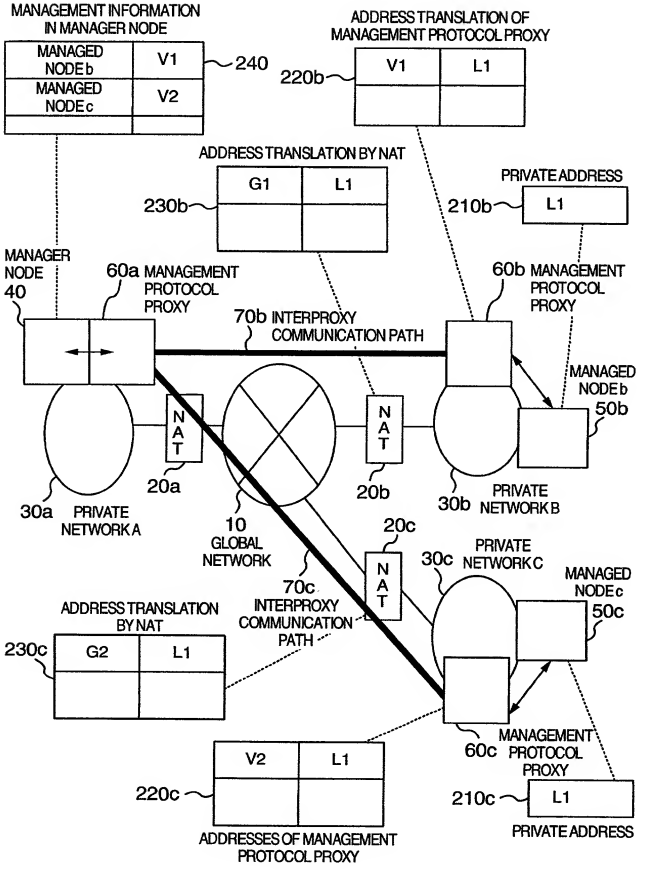

MANAGEMENT INFORMATION IN MANAGER NODE
MANAGED NODE b
V1
MANAGED NODE c
V2
240
ADDRESS TRANSLATION OF MANAGEMENT PROTOCOL PROXY
220b
V1
L1
ADDRESS TRANSLATION BY NAT
230b
G1
L1
PRIVATE ADDRESS
210b
L1
MANAGER NODE 40
60a MANAGEMENT PROTOCOL PROXY
70b INTERPROXY COMMUNICATION PATH
60b MANAGEMENT PROTOCOL PROXY
MANAGED NODE b
50b
NAT
20a
NAT
20b
30a PRIVATE NETWORK A
10 GLOBAL NETWORK
30b PRIVATE NETWORK B
20c
70c INTERPROXY COMMUNICATION PATH
NAT
30c PRIVATE NETWORK C
MANAGED NODE c
50c
ADDRESS TRANSLATION BY NAT
230c
G2
L1
60c MANAGEMENT PROTOCOL PROXY
V2
L1
220c
210c
L1
ADDRESSES OF MANAGEMENT PROTOCOL PROXY
PRIVATE ADDRESS

FIG. 10

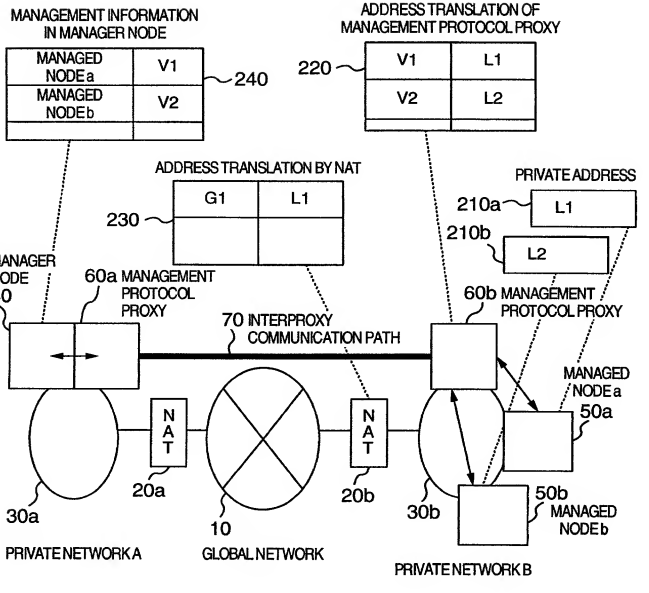

MANAGEMENT INFORMATION IN MANAGER NODE
MANAGED NODE a
V1
MANAGED NODE b
V2
240
ADDRESS TRANSLATION OF MANAGEMENT PROTOCOL PROXY
220
V1
L1
V2
L2
ADDRESS TRANSLATION BY NAT
230
G1
L1
PRIVATE ADDRESS
210a
L1
210b
L2
MANAGER NODE
40
60a MANAGEMENT PROTOCOL PROXY
70 INTERPROXY COMMUNICATION PATH
60b MANAGEMENT PROTOCOL PROXY
MANAGED NODE a
50a
NAT
20a
NAT
20b
30a
10
30b
50b
MANAGED NODE b
PRIVATE NETWORK A
GLOBAL NETWORK
PRIVATE NETWORK B

FIG. 11

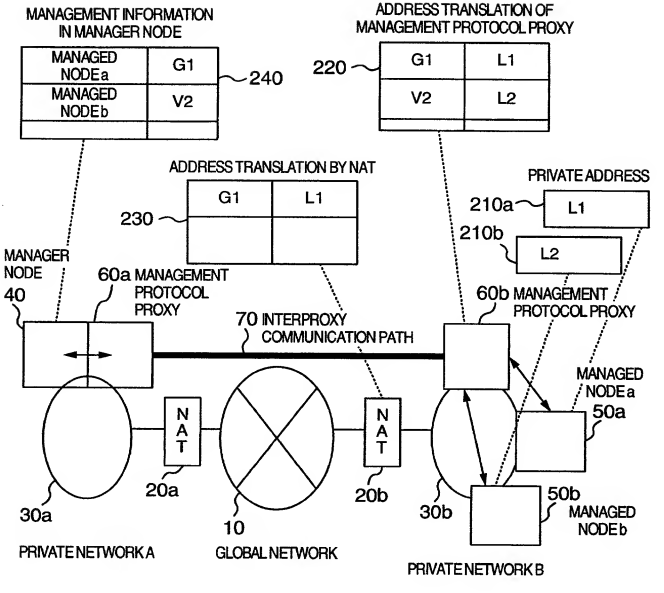

MANAGEMENT INFORMATION IN MANAGER NODE
MANAGED NODE a
G1
MANAGED NODE b
V2
240
ADDRESS TRANSLATION OF MANAGEMENT PROTOCOL PROXY
220
G1
L1
V2
L2
ADDRESS TRANSLATION BY NAT
230
G1
L1
PRIVATE ADDRESS
210a
L1
210b
L2
MANAGER NODE
40
60a MANAGEMENT PROTOCOL PROXY
60b MANAGEMENT PROTOCOL PROXY
70 INTERPROXY COMMUNICATION PATH
MANAGED NODE a
50a
NAT
20a
NAT
20b
30a
30b
50b
MANAGED NODE b
10
PRIVATE NETWORK A
GLOBAL NETWORK
PRIVATE NETWORK B

FIG. 12

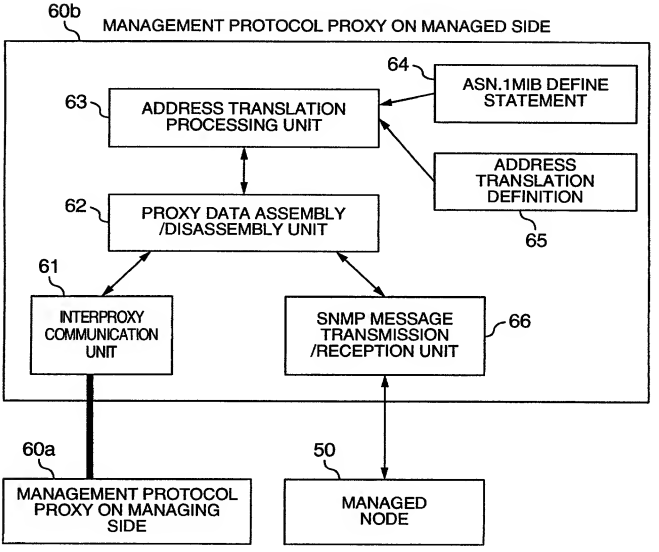

60b
MANAGEMENT PROTOCOL PROXY ON MANAGED SIDE
64
ASN.1MIB DEFINE STATEMENT
63
ADDRESS TRANSLATION PROCESSING UNIT
ADDRESS TRANSLATION DEFINITION
65
62
PROXY DATA ASSEMBLY /DISASSEMBLY UNIT
61
INTERPROXY COMMUNICATION UNIT
SNMP MESSAGE TRANSMISSION /RECEPTION UNIT
66
60a
MANAGEMENT PROTOCOL PROXY ON MANAGING SIDE
50
MANAGED NODE

FIG. 13

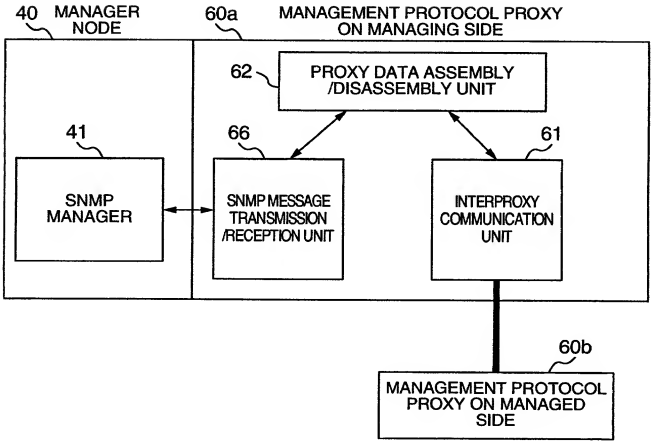


FIG. 14

SNMP MESSAGE TRANSMISSION SOURCE
SNMP MESSAGE TRANSMISSION DESTINATION
SNMP PDU

FIG. 15

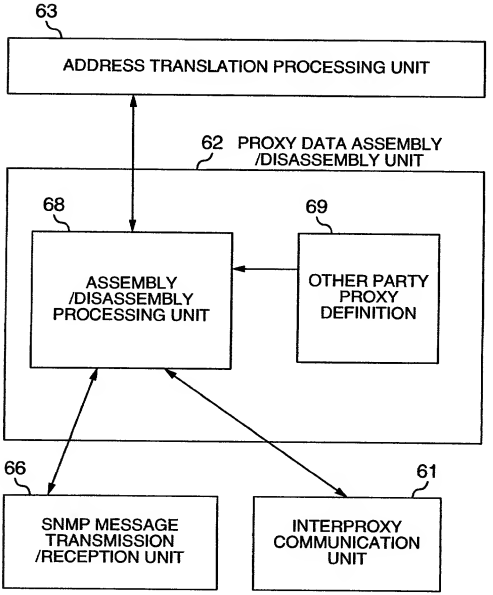

63
ADDRESS TRANSLATION PROCESSING UNIT
62 PROXY DATA ASSEMBLY /DISASSEMBLY UNIT
68
69
ASSEMBLY /DISASSEMBLY PROCESSING UNIT
OTHER PARTY PROXY DEFINITION
66
61
SNMP MESSAGE TRANSMISSION /RECEPTION UNIT
INTERPROXY COMMUNICATION UNIT

FIG. 16

69 OTHER PARTY PROXY DEFINITION

TRANSMISSION DESTINATION ADDRESS	OTHER PARTY PROXY ADDRESS	
100. *. *. *	200. 10. 20. 30	~311
101. 10. *. *	200. 10. 20. 30	~312
110. 20. 80. *	210. 25. 15. 5	~313
120. 60. 11. 8	230. 51. 62. 72	~314

FIG. 17

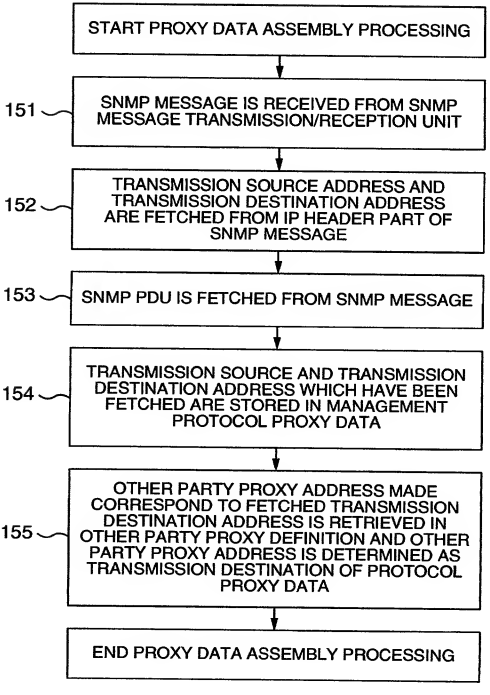

START PROXY DATA ASSEMBLY PROCESSING
151
SNMP MESSAGE IS RECEIVED FROM SNMP MESSAGE TRANSMISSION/RECEPTION UNIT
152
TRANSMISSION SOURCE ADDRESS AND TRANSMISSION DESTINATION ADDRESS ARE FETCHED FROM IP HEADER PART OF SNMP MESSAGE
153
SNMP PDU IS FETCHED FROM SNMP MESSAGE
154
TRANSMISSION SOURCE AND TRANSMISSION DESTINATION ADDRESS WHICH HAVE BEEN FETCHED ARE STORED IN MANAGEMENT PROTOCOL PROXY DATA
155
OTHER PARTY PROXY ADDRESS MADE CORRESPOND TO FETCHED TRANSMISSION DESTINATION ADDRESS IS RETRIEVED IN OTHER PARTY PROXY DEFINITION AND OTHER PARTY PROXY ADDRESS IS DETERMINED AS TRANSMISSION DESTINATION OF PROTOCOL PROXY DATA
END PROXY DATA ASSEMBLY PROCESSING

FIG. 18

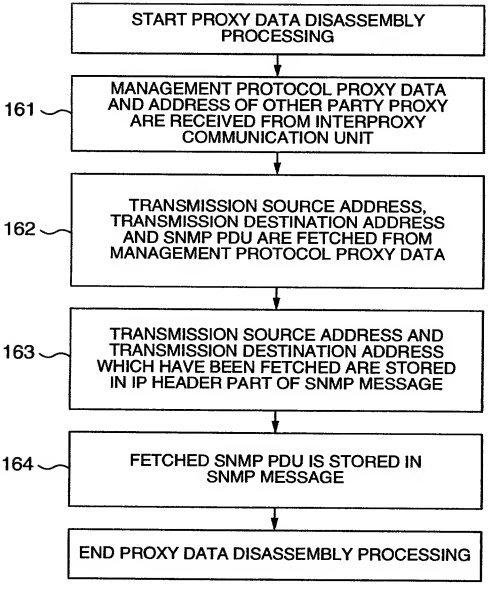

START PROXY DATA DISASSEMBLY PROCESSING
161
MANAGEMENT PROTOCOL PROXY DATA AND ADDRESS OF OTHER PARTY PROXY ARE RECEIVED FROM INTERPROXY COMMUNICATION UNIT
162
TRANSMISSION SOURCE ADDRESS, TRANSMISSION DESTINATION ADDRESS AND SNMP PDU ARE FETCHED FROM MANAGEMENT PROTOCOL PROXY DATA
163
TRANSMISSION SOURCE ADDRESS AND TRANSMISSION DESTINATION ADDRESS WHICH HAVE BEEN FETCHED ARE STORED IN IP HEADER PART OF SNMP MESSAGE
164
FETCHED SNMP PDU IS STORED IN SNMP MESSAGE
END PROXY DATA DISASSEMBLY PROCESSING

FIG. 19

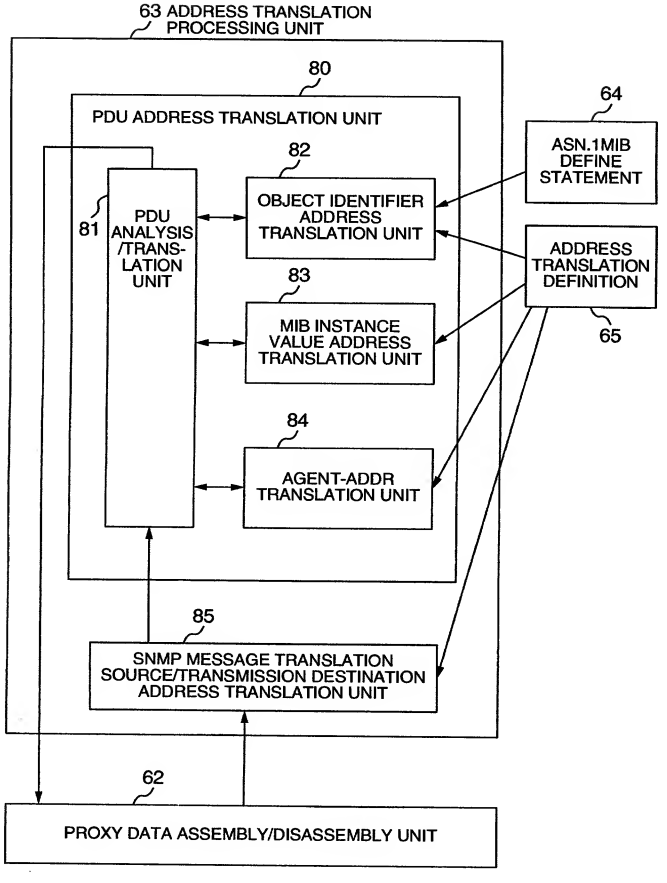

63 ADDRESS TRANSLATION PROCESSING UNIT
80
PDU ADDRESS TRANSLATION UNIT
64
ASN.1MIB DEFINE STATEMENT
82
81
PDU ANALYSIS /TRANS-LATION UNIT
OBJECT IDENTIFIER ADDRESS TRANSLATION UNIT
ADDRESS TRANSLATION DEFINITION
83
MIB INSTANCE VALUE ADDRESS TRANSLATION UNIT
65
84
AGENT-ADDR TRANSLATION UNIT
85
SNMP MESSAGE TRANSLATION SOURCE/TRANSMISSION DESTINATION ADDRESS TRANSLATION UNIT
62
PROXY DATA ASSEMBLY/DISASSEMBLY UNIT

FIG. 20

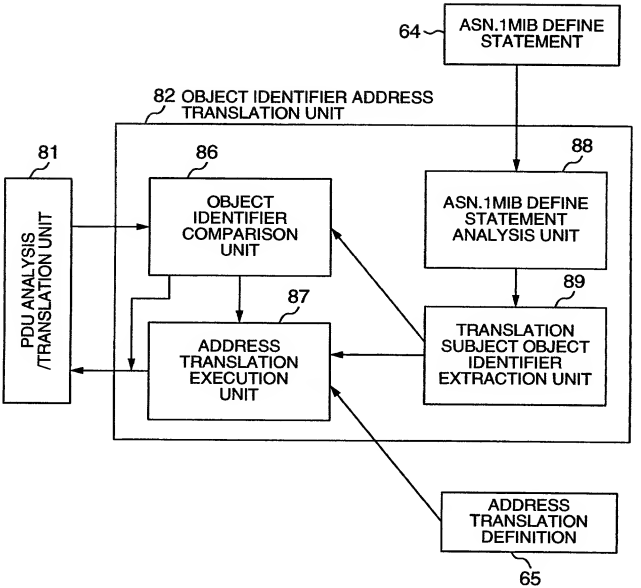

64
ASN.1MIB DEFINE STATEMENT
82 OBJECT IDENTIFIER ADDRESS TRANSLATION UNIT
81
PDU ANALYSIS /TRANSLATION UNIT
86
OBJECT IDENTIFIER COMPARISON UNIT
88
ASN.1MIB DEFINE STATEMENT ANALYSIS UNIT
87
ADDRESS TRANSLATION EXECUTION UNIT
89
TRANSLATION SUBJECT OBJECT IDENTIFIER EXTRACTION UNIT
ADDRESS TRANSLATION DEFINITION
65

FIG. 21

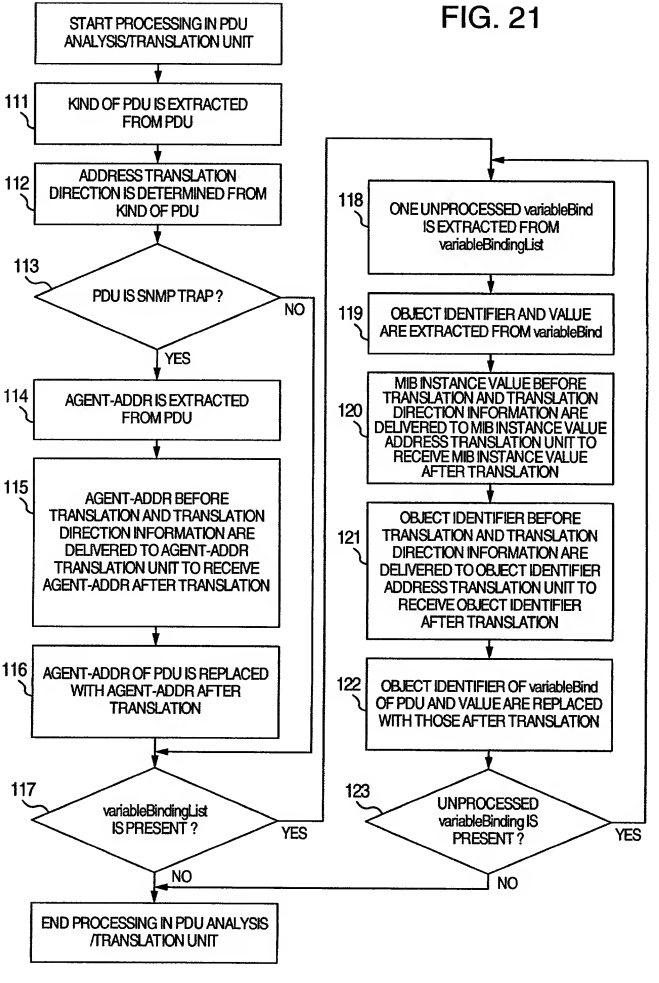

START PROCESSING IN PDU ANALYSIS/TRANSLATION UNIT
111
KIND OF PDU IS EXTRACTED FROM PDU
112
ADDRESS TRANSLATION DIRECTION IS DETERMINED FROM KIND OF PDU
113
PDU IS SNMP TRAP ?
NO
YES
114
AGENT-ADDR IS EXTRACTED FROM PDU
115
AGENT-ADDR BEFORE TRANSLATION AND TRANSLATION DIRECTION INFORMATION ARE DELIVERED TO AGENT-ADDR TRANSLATION UNIT TO RECEIVE AGENT-ADDR AFTER TRANSLATION
116
AGENT-ADDR OF PDU IS REPLACED WITH AGENT-ADDR AFTER TRANSLATION
117
variableBindingList IS PRESENT ?
YES
NO
END PROCESSING IN PDU ANALYSIS /TRANSLATION UNIT
118
ONE UNPROCESSED variableBind IS EXTRACTED FROM variableBindingList
119
OBJECT IDENTIFIER AND VALUE ARE EXTRACTED FROM variableBind
120
MIB INSTANCE VALUE BEFORE TRANSLATION AND TRANSLATION DIRECTION INFORMATION ARE DELIVERED TO MIB INSTANCE VALUE ADDRESS TRANSLATION UNIT TO RECEIVE MIB INSTANCE VALUE AFTER TRANSLATION
121
OBJECT IDENTIFIER BEFORE TRANSLATION AND TRANSLATION DIRECTION INFORMATION ARE DELIVERED TO OBJECT IDENTIFIER ADDRESS TRANSLATION UNIT TO RECEIVE OBJECT IDENTIFIER AFTER TRANSLATION
122
OBJECT IDENTIFIER OF variableBind OF PDU AND VALUE ARE REPLACED WITH THOSE AFTER TRANSLATION
123
UNPROCESSED variableBinding IS PRESENT ?
YES
NO

FIG. 22

TRANSMISSION DIRECTION	TRANSLATION DIRECTION	KIND OF PDU
FROM MANAGER SIDE TO MANAGED NODE SIDE	TRANSLATION FROM REAL ADDRESS TO MANAGEMENT ADDRESS	Get-Request,Getnext-Request,Set-Request
FROM MANAGED NODE SIDE TO MANAGER SIDE	TRANSLATION FROM REAL ADDRESS TO MANAGEMENT ADDRESS	Get-Response,Trap

FIG. 23

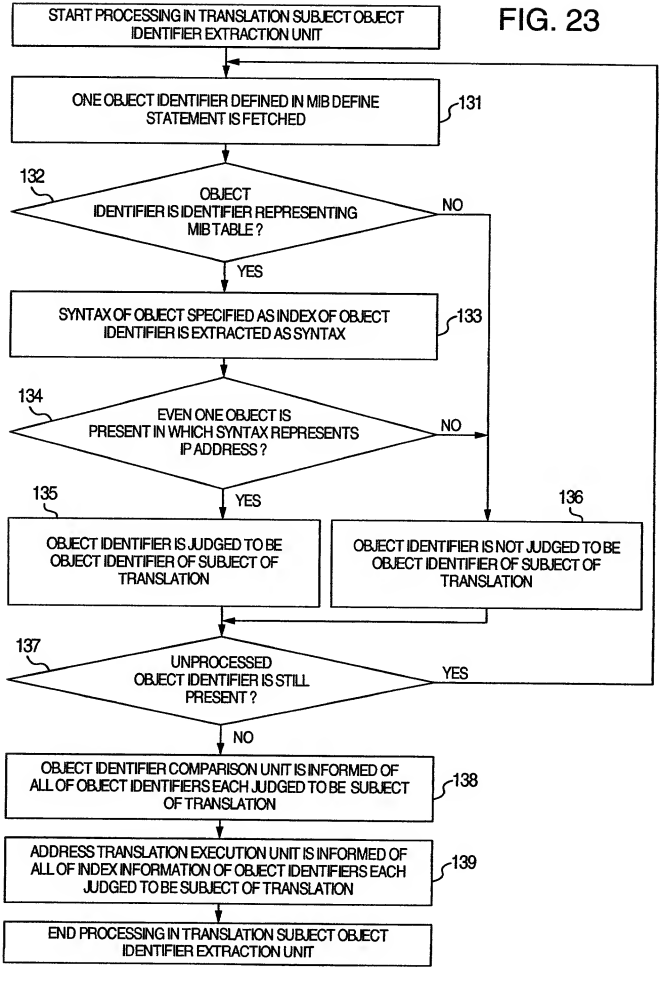

START PROCESSING IN TRANSLATION SUBJECT OBJECT IDENTIFIER EXTRACTION UNIT
ONE OBJECT IDENTIFIER DEFINED IN MIB DEFINE STATEMENT IS FETCHED
131
132
OBJECT IDENTIFIER IS IDENTIFIER REPRESENTING MIB TABLE ?
NO
YES
SYNTAX OF OBJECT SPECIFIED AS INDEX OF OBJECT IDENTIFIER IS EXTRACTED AS SYNTAX
133
134
EVEN ONE OBJECT IS PRESENT IN WHICH SYNTAX REPRESENTS IP ADDRESS ?
NO
YES
135
OBJECT IDENTIFIER IS JUDGED TO BE OBJECT IDENTIFIER OF SUBJECT OF TRANSLATION
136
OBJECT IDENTIFIER IS NOT JUDGED TO BE OBJECT IDENTIFIER OF SUBJECT OF TRANSLATION
137
UNPROCESSED OBJECT IDENTIFIER IS STILL PRESENT ?
YES
NO
OBJECT IDENTIFIER COMPARISON UNIT IS INFORMED OF ALL OF OBJECT IDENTIFIERS EACH JUDGED TO BE SUBJECT OF TRANSLATION
138
ADDRESS TRANSLATION EXECUTION UNIT IS INFORMED OF ALL OF INDEX INFORMATION OF OBJECT IDENTIFIERS EACH JUDGED TO BE SUBJECT OF TRANSLATION
139
END PROCESSING IN TRANSLATION SUBJECT OBJECT IDENTIFIER EXTRACTION UNIT

FIG. 24

65 ADDRESS TRANSLATION DEFINITION

ADDRESS FOR MANAGEMENT	REAL ADDRESS	
100. *. *. *	10. *. *. *	301
101. 10. *. *	172. 16. *. *	302
110. 20. 80. *	172. 17. 50. *	303
120. 60. 11. 8	192. 168. 20. 5	304

FIG. 25

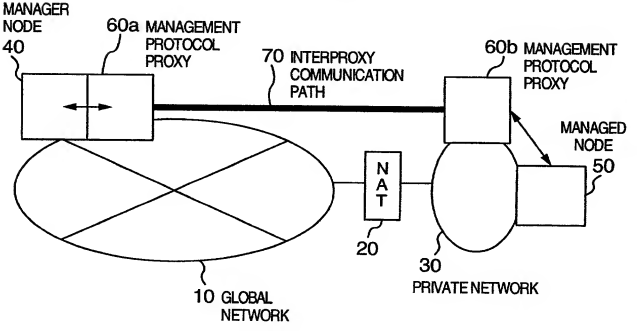


FIG. 26

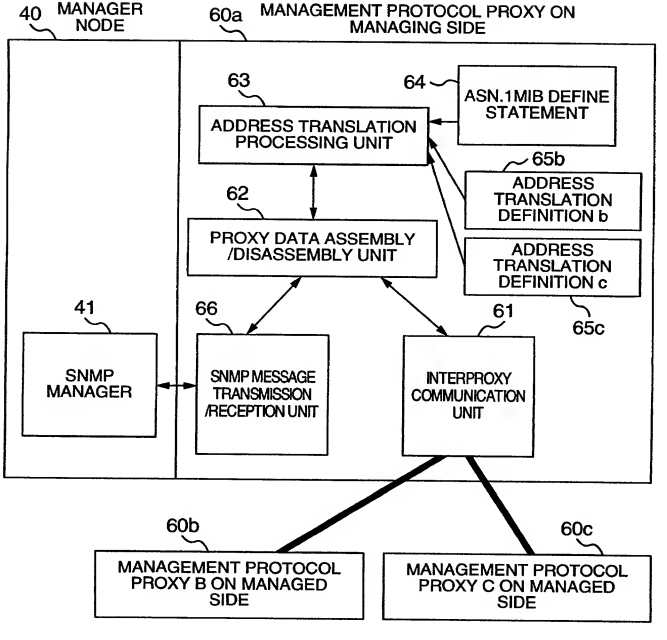

40
MANAGER NODE
60a
MANAGEMENT PROTOCOL PROXY ON MANAGING SIDE
63
64
ASN.1MIB DEFINE STATEMENT
ADDRESS TRANSLATION PROCESSING UNIT
65b
ADDRESS TRANSLATION DEFINITION b
62
PROXY DATA ASSEMBLY /DISASSEMBLY UNIT
ADDRESS TRANSLATION DEFINITION c
65c
41
66
61
SNMP MANAGER
SNMP MESSAGE TRANSMISSION /RECEPTION UNIT
INTERPROXY COMMUNICATION UNIT
60b
60c
MANAGEMENT PROTOCOL PROXY B ON MANAGED SIDE
MANAGEMENT PROTOCOL PROXY C ON MANAGED SIDE

FIG. 27

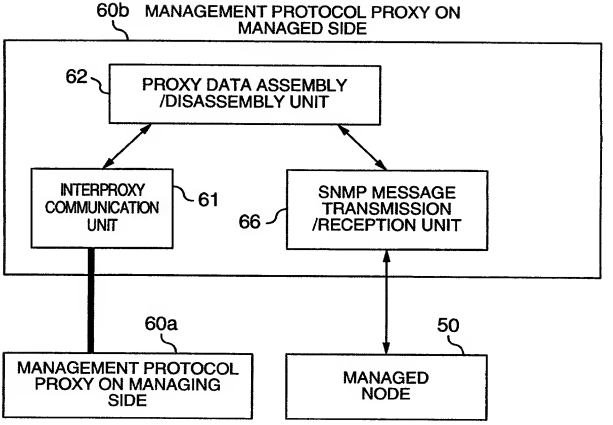

60b MANAGEMENT PROTOCOL PROXY ON MANAGED SIDE
62
PROXY DATA ASSEMBLY /DISASSEMBLY UNIT
INTERPROXY COMMUNICATION UNIT
61
66
SNMP MESSAGE TRANSMISSION /RECEPTION UNIT
60a
50
MANAGEMENT PROTOCOL PROXY ON MANAGING SIDE
MANAGED NODE

FIG. 28

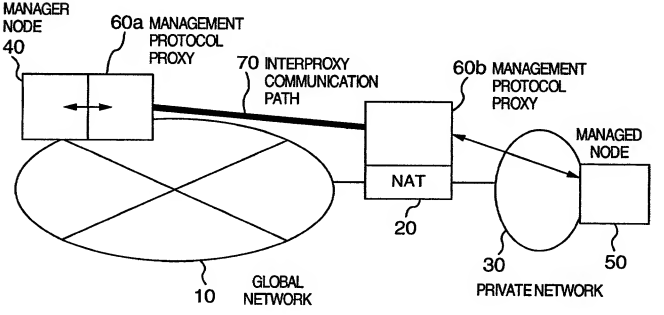
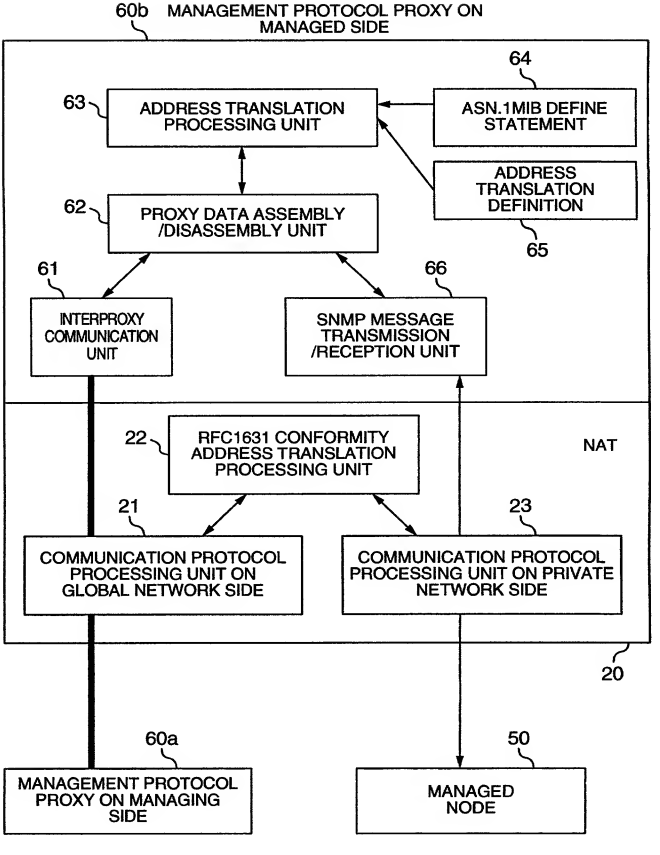

MANAGER NODE
40
60a MANAGEMENT PROTOCOL PROXY
70 INTERPROXY COMMUNICATION PATH
60b MANAGEMENT PROTOCOL PROXY
MANAGED NODE
NAT
20
30
50
10
GLOBAL NETWORK
PRIVATE NETWORK

FIG. 29


60b MANAGEMENT PROTOCOL PROXY ON MANAGED SIDE
64
63
ADDRESS TRANSLATION PROCESSING UNIT
ASN.1MIB DEFINE STATEMENT
ADDRESS TRANSLATION DEFINITION
65
62
PROXY DATA ASSEMBLY /DISASSEMBLY UNIT
61
66
INTERPROXY COMMUNICATION UNIT
SNMP MESSAGE TRANSMISSION /RECEPTION UNIT
22
RFC1631 CONFORMITY ADDRESS TRANSLATION PROCESSING UNIT
NAT
21
23
COMMUNICATION PROTOCOL PROCESSING UNIT ON GLOBAL NETWORK SIDE
COMMUNICATION PROTOCOL PROCESSING UNIT ON PRIVATE NETWORK SIDE
20
60a
50
MANAGEMENT PROTOCOL PROXY ON MANAGING SIDE
MANAGED NODE